

tem, on the other hand, the digital information connection is not between network nodes but between the base station (which is, itself, a terminating network node) and a plurality of subscribers within what is, in effect, one cell, using a common channel.

Id. Emphasizing the later point, InterDigital further pointed out that:

Goldman et al. provide trunk lines that are point-to-point, not point-to-multipoint as in applicant's system. In applicants' system you may have a plurality of subscribers randomly located and capable of substantially simultaneously transmitting and receiving over a common radio channel.

Id. Emphasizing the first point, InterDigital went on to note:

Applicants use time division multiple access (TDMA) in connecting the multiple subscribers to the base station, whereas Goldman et al. use only time division (TDM), and, furthermore, only between the cell sites and the controller, not between a base station and multiple subscribers as in applicants' system. Applicants' system, in other words, utilizes the same propagation path (link) for all the subscribers that are connected to an individual base station, whereas Goldman et al. use a plurality of links for connecting each cell to each other cell. [Emphasis added.]

Joint Ex. 11, JME 01759.

InterDigital is thus correct that in that amendment InterDigital distinguished the Goldman et al. reference because Goldman et al. used time division circuits only for connection between cells over wired links, while the applicants' system used time division circuits for connections between cells over wireless links. InterDigital is incorrect that the amendment "did not even remotely concern the number of base stations" or deal with the "number of cells." Both are clearly addressed in the amendment, and, as noted above, InterDigital's own expert agreed that InterDigital was describing its system as a single cell system.

Following that admission, Dr. Levesque attempted to equate "base station" to the NCS disclosed in Goldman et al. and that by doing so the "terminating node" in Goldman et al. would include multiple cell sites:

Q. What is the terminating network node in Goldman?

A. Well, if you'll look in Goldman what you see is an arrangement of - I'm a little hesitant about the labeling used in the Goldman patent. There is a point at which - there we go. What we see here is, for example, one of the connections to the telephone network. You see here a central office. So, this is the central

office in the telephone network. What we see here are lines connecting to this network control system. Therefore, by my understanding of a base station, everything from this interface to the public network would constitute a base station if we were to apply the same definition that I'm surmising out of the patents that we have.

Q. Would the terminating node include multiple cell sites?

A. In this case, in this diagram, the terminating node includes multiple cell sites.

Transcript at 178. Indeed, the "terminating node" in Goldman et al. at the NCS does, in fact, ultimately branch to multiple cell sites, each of which has a base station. And earlier, Dr. Levesque testified that although he could not find any definition for "base station" in the Paneth patents, he interpreted the term as encompassing all of the equipment between the public network interface and the radio link:

Q. Dr. Levesque, you used the term base station. How is the term base station used and defined in these Paneth patents?

A. Well, there was no – I found no language in the patents that explicitly said in the defining sense the base station is the following. What I interpreted from reading the patents is that the base station in these patents, in the language of these patents, encompasses all of the equipment between the public network interface and the radio link, the wireless side.

Transcript at 159.

In the Paneth patents, however, there is but a single base station illustrated and described. In Goldman et al., the "base stations" are clearly the multiple "base radio stations" or "base transceivers." It is clear that in Goldman et al. the corresponding "base station(s)" do *not* encompass "all of the equipment between the public network interface and the radio link." In Goldman et al., each base station is clearly *not* a terminating network node, as contrasted from the applicant's system as InterDigital described it in the above amendment. Construing Goldman et al. to sweep all of the multiple base stations and the NCS into the term "base station" is equivalent to comparing apples and oranges, and would render InterDigital's arguments over Goldman et al., discussed above, nonsensical.

The prosecution history and the testimony from the *Markman* hearing thus lend support to Ericsson's "single base station" argument. That same prosecution history and testimony provide no support for InterDigital's position.

d) Prosecution History of the '420 Patent

Ericsson also points to the prosecution history of the '420 patent. Joint Ex. 10. The '420 patent issued on March 7, 1989 from application Serial No. 70,970, filed on July 8, 1987, and is entitled "Initialization of Communication Channel Between a Subscriber Station and a Base Station in a Subscriber Communication System." The application maturing into the '089 patent-in-suit was filed four months earlier on March 27, 1987, as a continuation of the parent application filed in 1985. The '420 patent, consistent with its title, explains that the "present invention generally pertains to subscriber communication systems and is particularly directed to initialization of a communication channel between a subscriber station and a base station in such a system." The patent further explains that such a "prior art subscriber communication system is described" in the then-pending application that ultimately became the '863 patent, and that the "preferred embodiment is useful with a base station described" in U.S. Patent No. 4,777,633. The file histories reveal that the '420 patent was prosecuted by Mr. Arthur A. Jacobs, the same attorney who prosecuted the application maturing into the '863 patent. Mr. Jacobs also prosecuted the applications maturing into the '705 and '450 patents-in-suit.

The application maturing into the '420 patent was originally filed with 17 claims, of which three were independent, i.e., claims 1, 3 and 12. Claim 1 of that application called for:

1. A subscriber communication system, wherein a base station is included in a network with a plurality of subscriber stations, and wherein control information is communicated between the station and the subscriber stations over a radio control channel (RCC) at a frequency selected by the base station from a plurality of predetermined frequencies, the system comprising:

a base station, including means for transmitting control messages over the RCC and for including a network number unique to the base station in the control messages; and

a plurality of subscriber stations, each including means for processing the network number in a said control message received over the RCC to enable the subscriber station to process the control message in accordance with whether the subscriber station is in the same network as the base station.

Independent claims 3 and 12 similarly called for "a base station." In a first Office action, the PTO rejected all 17 claims under 35 U.S.C. § 102(e) as being anticipated by the '863 patent which by the time of the Office action had issued.

In response, InterDigital, through its predecessor-in-interest, cancelled claim 1 and added new claim 18 which called for:

18. A subscriber communication system, including a plurality of base stations, each in a separate network, the base station in each network being in selective communication with a plurality of subscriber stations and having means to transmit control information to its subscriber stations over a radio control channel (RCC) at a frequency selected by the base station from a plurality of predetermined frequencies;

each base station including means for transmitting over the RCC both control messages to the subscriber stations in its network and a network number unique to that base station; and

each subscriber station in each network including means for receiving the network number from any base station in the system over its respective RCC to enable that subscriber station to determine whether it is in the same network as a particular base station having a particular network number. [Emphasis added.]

Application claim 18 ultimately became claim 1 of the '420 patent. The other two independent claims, namely claims 3 and 12, were also amended to call for multiple base stations. Specifically, claim 3 was amended, in part, as shown below with additions from original claim 3 as filed indicated by underlining and with deletions indicated by brackets:

3. (amended) A subscriber communication system [, wherein communications are transmitted over a given communication channel between a base station and subscriber station, comprising] including a plurality of base stations, each in a separate network, the base station in each network being in selective communication with a plurality of subscriber stations and having means to transmit control information to its subscriber stations over a radio control channel (RCC) at a frequency selected by the base station from a plurality of predetermined frequencies

[a] each base station, including

* * * * *

Claim 12 was amended, in part, in a similar fashion where once again additions from original claim 12 are shown by underlining and deletions are shown in brackets:

12. (amended) A subscriber communication system including a plurality of base stations, each in a separate network, the base station in each network being in selective communication with a plurality of subscriber stations and having means to transmit control information to its subscriber stations over a radio control channel (BCC) at a frequency selected by the base station from a plurality of pre-determined frequencies wherein voice data signals are communicated over an assigned channel between a line appearance that couples a base station to a central office and a line interface that couples a subscriber station to a subscriber terminal, [comprising] at a base station,

[a] each base station being coupled to a line appearance for providing an assigned channel for communicating voice data signals between the line appearance and a subscriber station;

* * * * *

After those amendments, the '420 patent issued.

In remarks accompanying that amendment, InterDigital, through its predecessor-in-interest, stated:

Reconsideration is requested of the rejection of the Claims 1-17 (now Claims 18 and 2-17) under 35 U.S.C. § 102(e) as being clearly anticipated by Paneth et al. [the '863 patent]. Paneth et al., which is commonly assigned by the assignee of the present application, does not disclose or claim a system containing a plurality of base stations, each of which is part of a local loop or network containing a plurality of subscriber stations, and wherein a subscriber station in any individual network has the ability to determine whether or not it is in the same network as a particular base station. On the contrary, Paneth et al. discloses only one network comprising a base station and a plurality of subscriber stations. It is, therefore, clear that not only do Paneth et al. not "clearly anticipate" the present invention under 35 U.S.C. § 102(e) but do not teach the present invention at all – even under 35 U.S.C. § 103. [Underlining in original, additional emphasis added.]

Both parties have taken some liberties with the above quotation. In its pre-hearing brief, Ericsson deleted "and wherein a subscriber station in any individual network has the ability to determine whether or not it is in the same network as a particular base station" and showed that deletion with an ellipses. InterDigital cried foul saying "Ericsson's selective quotation" materially changed the meaning. InterDigital's Pre-Hearing Reply Brief at 5. According to InterDigital, the "language Ericsson omitted ('a particular base station') demonstrates that InterDigital did not exclude, and indeed

that it even contemplated, a network that included more than one base station." *Id.* The foregoing quotation, considered as a whole, says nothing of the sort. That quotation quite clearly is a description of the disclosure in the '863 patent made to the PTO by someone who had first-hand knowledge of that disclosure, namely the same attorney, Mr. Jacobs, who had filed and prosecuted (and had thus assumed professional responsibility for) the application leading to the '863 patent, and who was then simultaneously prosecuting, and had the same responsibility for, the application that he had filed for the '089 patent.¹⁰ The '863 patent, Mr. Jacobs duly noted, was commonly assigned to the same assignee. Mr. Jacobs also advised the PTO that the '863 patent did not disclose or claim several features.

Specifically, Mr. Jacobs advised the PTO that the '863 patent did not "disclose or claim a system containing a plurality of base stations, [1] each of which is part of a local loop or network containing a plurality of subscriber stations, and [2] wherein a subscriber station in any individual network has the ability to determine whether or not it is in the same network as a particular base station."

It is possible, perhaps, to construe Mr. Jacobs' words as conditioning his initial statement that the '863 patent neither discloses nor claims a system containing multiple base stations on provisos [1] and [2]. But any potential lingering doubt is removed by his subsequent unequivocal statement that: "On the contrary, Paneth et al. [the '863 patent] discloses only one network comprising a base station and a plurality of subscriber stations."

In its post-hearing brief, InterDigital states that "[i]n seeking that patent's [the '420 patent] issuance, InterDigital noted that the Paneth patents 'in effect' describe a single network (i.e., a base station as defined in the Paneth patents in communication with subscriber stations) and that the '420 patent combines those networks into a system including multiple base stations," citing that portion

¹⁰ It is noted, for example, that the above-discussed amendment signed by Mr. Jacobs in the application maturing into the '420 patent bears a date of August 10, 1988. The file history for the application maturing into the '089 patent contains an amendment signed by Mr. Jacobs bearing a date of July 5, 1988, approximately one month earlier. In both instances, those dates are typed on the amendments, perhaps indicating the date of preparation or signing. In any event, those amendments were filed shortly thereafter. The amendment in the application for the '089 patent contains several references to portions of the specification that Mr. Jacobs said supported various positions advanced in that amendment. Once again, the specifications for the '863 and '089 patents are the same. The amendment in the application for the '089 patent precipitated a Notice of Allowability bearing a date of July 18, 1988, and Mr. Jacobs signed the Issue Fee Transmittal on August 19, 1988. It thus seems to be reasonably clear that Mr. Jacobs was (or should have been) concurrently familiar with the common disclosure for the '863 and '089 patents when he filed the above-discussed amendment in the application leading to the '420 patent.

of the prosecution history of the '420 patent discussed above. InterDigital's Post-Hearing Brief at 3. The words "in effect" appear nowhere in the referenced portion of the prosecution history of the '420 patent. InterDigital did not use those words of equivocation then, and if InterDigital's use of those words in quotations in its brief was intended as a characterization of what it said earlier, the record simply provides no support for that characterization.

Ericsson, for its part, states that the portion it dropped from the quotation and showed by ellipses would be quoted on page 10 of its post-hearing brief. Ericsson's Post-Hearing Brief at 6 n. 11. Presumably turning to page 10, one would find the missing material and some discussion. One finds neither. In any event, the relative significance of the omitted material is addressed above.

InterDigital also argues that "[s]tatements made in later filed patent applications may not be used to limit an earlier issued unrelated patent," citing *Water Tech. Corp. v. Calco, Ltd.*, 850 F.2d 660, 667 (Fed. Cir. 1988), *cert. denied sub nom., Calco, Ltd. v. Water Tech. Corp.*, 488 U.S. 968 (1988). The Federal Circuit did not, however, issue such a seemingly "black letter" rule precluding reference to later filed applications.

In *Water Tech.*, there were four patents-in-suit generally drawn to improved bactericidal resins used as disinfectants for purifying water. Two professors at Kansas State University, Lambert and Fina, developed a process able to purify water, rendering it bacterially sterile, by passing the water through a strongly basic anion exchange resin containing triiodide. Lambert and Fina subsequently obtained two patents on their work (the "Lambert-Fina Patents"). Those two patents were exclusively licensed to Aqua-Chem, Inc. Dr. Gary L. Hatch, an employee of Aqua-Chem, then developed two improvements which were covered by the other two patents-in-suit, namely the "Hatch Patents." During the prosecution of the Hatch Patents, several years after the Lambert-Fina Patents had issued, the attorney prosecuting the Hatch applications argued that the Lambert-Fina Patents (prior art to the Hatch applications) were limited to triiodide-containing resins. Under those facts, the Federal Circuit remarked that "[w]e see no reason why arguments made by a different attorney prosecuting later patent applications for a different inventor should be used to limit an earlier-issued patent." 850 F.2d at 667. The Federal Circuit might have added, consistent with the facts of the case, that not only were there different inventors, but the attorney prosecuting the later applications (1) worked on behalf of a different assignee when he made those statements, (2) had no connection

with the assignee of the original two Lambert-Fina Patents, and (3) had no first-hand knowledge of, or responsibility for, the Lambert-Fina Patents.

The present situation, of course, stands in marked contrast. As noted above, Mr. Jacobs bore professional responsibility for filing and prosecuting the original application that matured into the '863 patent having a specification that was shared with the "Paneth" or "System" patents, namely the '089, '705, '358 and '194 patents-in-suit. Whether Mr. Jacobs personally wrote that application or whether that application was prepared under his guidance and direction is not revealed by the record, but is of little consequence under the facts of this case. The file histories for the '863, '089 and '705 patents show that Mr. Jacobs signed various papers filed with the PTO in conjunction with those applications, and had assumed professional responsibility for those applications regardless of whether he personally applied ink to paper or fingers to keyboard. The file histories also reveal that Mr. Jacobs worked on behalf of the common assignee of those patents (or, more precisely, InterDigital's predecessor-in-interest), as well as of the '420 patent-in-suit, during the prosecution of those patents. Further, although the '420 patent has a different "inventive entity," meaning a different combination of co-inventors from the '089, '705, '358 and '194 patents-in-suit, Graham M. Avis, the first named inventor on the '420 patent, is also listed as one of the co-inventors of the '089, '705, '358 and '194 patents-in-suit. Although InterDigital refers to the '089, '705, '358 and '194 patents-in-suit as the "Paneth Patents" and the '420 patent-in-suit as the "Avis '420 patent," there is no complete lack of inventor over-lap as was the situation in *Water Tech*. Also, although the '863 patent issued under circumstances in which it was a proper reference under § 102(e), Mr. Jacobs filed the application for the '420 patent when the application for the '863 patent was still pending, and filed an amendment in the co-pending application for the '089 patent (leading to the issuance of the '089 patent) concurrently (or, at least reasonably so) at a point in time when he filed the subject amendment in the application leading to the '420 patent.

The point made in *Water Tech* is that patentees obviously cannot be saddled with characterizations of their patent(s) made by third parties, even if that third party is a licensee. Indeed, if that were so, third parties, including licensees, would have an incentive to disparage or attempt to limit the scope of the disclosure or claims of a dominating patent through arguments and comments made during prosecution of their own applications. In appropriate circumstances, such arguments and comments may be viewed as evidence of how one of ordinary skill in the art would construe a

reference patent's disclosure, in which case the potential for bias must be evaluated, but that is significantly different from viewing comments attributable to the patentee or her assignee.

Additionally, the '420 patent is not wholly unrelated to the "Paneth" or "System" patents. It is true that the '420 patent does not claim domestic priority under 35 U.S.C. § 120 to one or more of the "Paneth" or "System" patents, but the '420 patent is clearly "related" in terms of (1) subject matter, (2) a shared co-inventor, (3) common ownership, and (4) in the case of the '863, '089 and '705 patents, a common prosecuting attorney working on behalf of the common assignee.

In the case-at-bar, for the foregoing reasons, *Water Tech.* does not preclude the court from considering the statements made during the prosecution of the application that later became the '420 patent-in-suit. Accordingly, those statements, along with the other evidence bearing on the issue, have been considered in reaching the recommendation offered below.

5. Ericsson's '900 Patent

In its post-hearing brief, InterDigital tenders a new argument, specifically that the base station illustrated in Fig. 2 of the Paneth Patents actually discloses multiple transceivers and therefore discloses multiple base stations, or multiple cells. InterDigital further argues that Ericsson so construed the Paneth patents in Ericsson's U.S. Patent No. 5,436,900 (the '900 patent).

With respect to the Ericsson '900 patent, InterDigital points to Fig. 1 of that patent and the accompanying description arguing that Ericsson characterized the Paneth Patents as disclosing plural base stations. InterDigital's Post-Hearing Brief at 4. InterDigital also refers to one sentence from the prosecution history of Ericsson's '900 patent arguing that the PTO also construed the Paneth Patents as disclosing multiple base stations. *Id.* at 5. Ericsson responds that InterDigital is misreading the '900 patent, and is confusing "transcoders" with the "transmitters and receivers." Ericsson's Post-Hearing Brief at 8. Ericsson further responds that Fig. 1 of its '900 patent does not describe the Paneth Patents, and that the '900 patent did not equate the figures of that patent with the "local loop '863 and '633 Patents." *Id.*

Ericsson is correct. The portion of the '900 patent that InterDigital relies on, column 1, lines 19-25 and column 2, lines 29-32, InterDigital's Post-Hearing Brief at 4-5, simply says that:

Such transcoder equipment is provided in the land system of the radio communication system. From U.S. Pat. Nos. 4,675,863 and 4,777,633, it is previously known to provide each traffic channel with its own transcoder in the land system. This transcoder usually is located in or in connection to one of the base stations of the land system.

* * * * *

The conventional land system of a mobile radio communication system shown in FIG. 1 comprises a mobile services switching center MSC, to which two base stations BS1 and BS2 are connected.

It is clear that the '900 patent is not describing the Paneth patents, other than in the sense of disclosing that it was known in the art to provide each traffic channel with its own transcoder. It is also clear that the '900 patent is not equating Fig. 1 with the overall disclosure of the '863 and '633 patents.

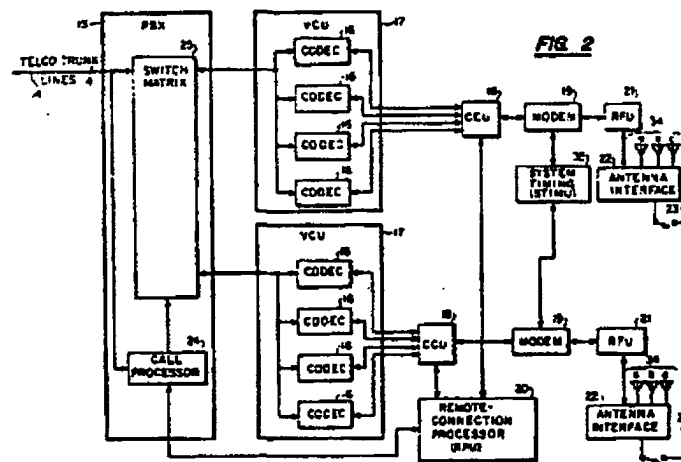
With respect to the prosecution history of the '900 patent that InterDigital relies on, in an Office action dated February 4, 1993, the PTO rejected one of the then-pending claims under § 103 in view of the '863 patent and another patent. The examiner, in that Office action, stated that "Paneth discloses a mobile communications system comprising a plurality of mobile and base stations, transcoder means 17 and switching means 15 * * *." Office action at 5. In response, the rejected claim was amended, and Ericsson noted that the Paneth patent "relates to a subscriber telephone system for providing multiple information signals simultaneously over one or more radio frequency channels. * * * The present invention * * * discloses a transcoder means comprising * * *. Since the [secondary reference] * * * also fails to disclose such a transcoder * * * it is respectfully submitted that the present application * * * is not obvious * * *." Amendment of May 4, 1993 at 7. Although the same claim was subsequently again rejected by the PTO, the '863 patent was not a basis for rejection. Office action of May 24, 1993 at 3. It does not appear that the '863 patent was ever again referenced in the prosecution leading to the '900 patent.

InterDigital's argument is not entitled to much, if any, weight, for the same reason that InterDigital urged the court to ignore Ericsson's arguments regarding the prosecution history of the '420 patent citing *Water Tech.* The object here, of course, is to construe disputed terms in the subject claims. What InterDigital or its representatives said about the claims or disclosure is, naturally, directly relevant. Nevertheless, even then the context must be considered, as it was above. What third parties say or might have said about the claims or disclosure of InterDigital's patents, whether in

other patents (or the prosecution thereof) or otherwise, assuming the same is even admissible, *might* provide some additional insight to how others have viewed the claims and disclosure, depending upon the content and context of the statement. But the actual probative value is likely to be slight or zero. After all, the Federal Circuit has consistently cautioned that patents must be construed based on the intrinsic record, aided in appropriate cases by trustworthy extrinsic evidence. That the statements are attributed to a party opponent may help jump the hurdle of admissibility as a statement against interest (but even that is questionable), nevertheless the probative value remains at best doubtful.

Moreover, Ericsson did not characterize the '863 patent as disclosing multiple base stations, and it cannot be fairly said that Ericsson adopted the examiner's view of the '863 patent. As the foregoing reveals, Ericsson distinguished the subject claim on other grounds. Further, insofar as the examiner's comment is concerned, it is clear that the '863 patent discloses multiple subscriber stations, but only one base station.

Fig. 2 of the '089 patent is again reproduced below for ease of reference:



The Paneth Patents disclose that "FIG.2 is a block diagram of an embodiment of the base station that supports the simultaneous operation of two pairs of transmit and receive frequency channels." The disclosure says that "[e]ach channel can process up to four phone connections simultaneously,"

and that "[i]n the preferred embodiment, there are many transmit and receive channel pairs," and that "[t]here are several time slots in each channel." (Col. 7, lines 51-57 of the '089 patent).

The disclosure could hardly be clearer. Fig. 2 is said to illustrate a base station that, as the disclosure says, "supports the simultaneous operation of two pairs of transmit and receive frequency channels." Contrary to InterDigital's post-hearing argument, the disclosure says nothing about multiple cells, and the disclosure says nothing about multiple base stations. The examiner's brief comment cannot change what is actually disclosed. The fact remains that the Paneth Patents disclose, as Mr. Jacobs accurately pointed out during the prosecution of the '420 patent, "only one network comprising a base station and a plurality of subscriber stations." The best that can be said for Fig. 2 and the accompanying disclosure is that the base station may include multiple pairs of transmit and receive channels.

6. Recommendation

As discussed above, the language of the claims calling variously for "a base station" or "the base station" or "said base station" is not decisive. Further, the use of those same terms in the specification is not decisive. Also, the fact that the specification discloses a system using a single base station is not decisive. Although not *per se* decisive, those factors nevertheless must be considered and are accorded at least some weight. Here, those factors weigh in favor of Ericsson's position. None weigh in InterDigital's favor. Similarly, that the two occurrences of "base stations" in the claims of the '089 patent were amended to the singular form during reexamination, and "base station" appears in singular form in the '705 patent claims, again although not decisive, weigh in favor of Ericsson's position. Also, once again, neither of those facts weigh in InterDigital's favor.

Turning to the prosecution history of the '863 patent, the parent shared by all of the '089, '705, '358 and '194 patents-in-suit, InterDigital through Mr. Jacobs distinguished the Goldman et al. reference:

Goldman et al. disclose a cellular system for the transmission of analog information signals (voice) between cells. They utilize digital signals only for control data. They also connect network nodes to each other through the network control system (NCS), as is clearly shown in Fig. 1. In applicant's system, on the other hand, the digital information connection is not between network nodes but between the base station (which is, itself, a terminating network node) and a plurality of subscribers within what is, in effect, one cell, using a common channel.

Joint Ex. 11, JME 01758, if not entirely, certainly in part, based on the fact that Goldman et al. disclosed a connection of network nodes through the NCS as shown in Fig. 1 of the Goldman et al. patent. Mr. Jacobs distinguished the applicant's system by pointing out that the base station was itself a terminating network node which even InterDigital's expert Dr. Levesque agreed described a single cell system. Although InterDigital tries to minimize and rationalize the import of that statement, the statement is clear and unequivocal. Moreover, Mr. Jacobs' characterization is factually correct. In Fig. 2 of the '089 and other Paneth Patents, the base station is plainly shown as the terminating network node. The accompanying description is in accord. Additionally, there is no illustration of, and no description of, another network, for example between base stations, such as disclosed in Goldman et al. Certainly Mr. Jacobs was also noting the analog versus digital difference from Goldman et al., but the differing topologies of the systems was also central to his remarks.

Also, of course, InterDigital, once again through Mr. Jacobs, characterized the '863 patent during the prosecution of the '420 patent, after receiving an anticipation rejection based on the '863 patent, and after amending the claims to call for multiple base stations, as:

Paneth et al. [the '863 patent], which is commonly assigned by the assignee of the present application, does not disclose or claim a system containing a plurality of base stations, each of which is part of a local loop or network containing a plurality of subscriber stations, and wherein a subscriber station in any individual network has the ability to determine whether or not it is in the same network as a particular base station. On the contrary, Paneth et al. discloses only one network comprising a base station and a plurality of subscriber stations. [Emphasis added.]

Joint Ex. 10, JME 01405. That characterization of the '863 patent is entirely consistent with the earlier remarks during the prosecution of the application maturing into the '863 patent, and is also entirely consistent with the drawings and specification. Moreover, when that characterization is viewed in the context of the amendment itself in which the claims in the application leading to the '420 patent were amended from "a base station" to "a plurality of base stations," a fair conclusion is that InterDigital through Mr. Jacobs was describing its own '863 patent as disclosing a system using a single base station. Moreover, that description, when considered in conjunction with the claim amendments, was not merely a passing comment or off-the-cuff remark, but was a direct and clearly worded representation focusing on the heart of the amendments to the claims and how those amendments distinguished over the '863 patent. Secondly, although reliance by the PTO is not nec-

essary to hold an applicant to her representations, all as discussed above, here, in fact, the PTO's next action was to allow the claims in the application and issue the '420 patent.

Although at this point only the second sentence in Mr. Jacobs' remarks has been discussed, the first sentence has not been ignored. In that first sentence, Mr. Jacobs says that the '863 patent "does not [1] disclose or [2] claim * * *." Taking first the disclosure, the specification common to the Paneth Patents does not disclose "a system containing a plurality of base stations." Even giving InterDigital's most recent argument about plural transceivers its broadest scope, the specification unmistakably discloses and illustrates a single base station, albeit with two transmitters and receivers. When the two following clauses are considered as qualifications to that statement, the specification *also* does not disclose "a system containing a plurality of base stations" in which each "is part of a local loop or network containing a plurality of subscriber stations." The specification further does not disclose "a system containing a plurality of base stations * * * wherein a subscriber station in any individual network has the ability to determine whether or not it is in the same network as a particular base station." In short, when InterDigital, through Mr. Jacobs, made the factual statement to the PTO that the specification common to the Paneth patents did not disclose "a system containing a plurality of base stations, each of which is part of a local loop or network containing a plurality of subscriber stations, and wherein a subscriber station in any individual network has the ability to determine whether or not it is in the same network as a particular base station," that statement was, and is, factually correct.

Mr. Jacobs' representation was also that the '863 patent did not claim "a system containing a plurality of base stations, each of which is part of a local loop or network containing a plurality of subscriber stations, and wherein a subscriber station in any individual network has the ability to determine whether or not it is in the same network as a particular base station." That representation is likewise factually correct in light of the '863 patent claims.

Accordingly, in view of the foregoing, the references in the asserted claims of the '089, '705, '358 and '194 patents to "a base station" should, in this instance, be construed to mean a single base station, i.e., a single cell system. With regard to the '194 patent, asserted independent claim 4 refers to "a base station," and that claim should be so construed. But, asserted independent claim 1 does not call for "a base station." As set out in the parties' respective proposed orders above, Ericsson nevertheless contends that when claim 1 of the '194 patent calls for:

(5) transmitting over an RF link to the receive unit the portion of each segment of the transmit signal channel containing the compressed signal samples representative of the information signal.

that means that the transmitting step is limited to communication between a single base station in a single cell system. There is simply no support for that position. There is nothing in claim 1 of the '194 patent that expressly limits the claim to a single base station or single cell system. Additionally, Ericsson points to nothing inherent in, or peculiar to, this straight forward step of "transmitting" that would necessarily limit this method step to being performed in a single base station/single cell system. Even though the specification discloses, as construed above, a single base station/single cell system, that does not *necessarily* mean that all claims must be limited to such a system. It is possible, of course, that the specification may not provide written description or enabling support for this step beyond the single base station/single cell system disclosed, but the record from the *Markman* hearing is insufficient to reach that conclusion here. Accordingly, that is an issue that must await trial.

In view of the foregoing, therefore, the special master recommends that the Court conclude that:

The references in the asserted claims of the '089, '705, and '358 patents, and in claims 4, 5 and 7 of the '194 patent to "a base station" mean a single base station, i.e., a single cell system. With regard to claims 1 and 2 of the '194 patent, those claims do not call for "a base station" and are not expressly limited to a single base station/single cell system.

IV.
The '089 and '705 Patents

A. "conversion means" – "analog information signals"

1. The Claims

The parties dispute centers on the "conversion means" elements of claim 1 of the '089 patent¹¹ and claim 1 of the '705 patent. Those elements are worded identically

Claim 1 – '089 Patent

conversion means at said base station for respective connection to said telephone lines for converting the analog information signals received from said telephone lines into digital signal samples and for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines;

Claim 1 – '705 Patent

conversion means at said base station for respective connection to said telephone lines for converting the analog information signals received from said telephone lines into digital signal samples and for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines;

In context, claim 1 of the '089 patent provides:

1. A digital wireless system comprising a base station in communication with telephone lines and a plurality of subscriber stations for the simultaneous transmission of information signals over radio frequency (RF) channels between the base station and each of said plurality of subscriber stations, comprising

conversion means at said base station for respective connection to said telephone lines for converting the analog information signals received from said telephone lines into digital signal samples and for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines;

signal compression means connected to said conversion means for simultaneously compressing separate digital signal samples derived from said conversion means to provide separate compressed signals;

channel control means connected to said signal compression means for sequentially combining the compressed signals into a single transmit bit stream, with each of the respective compressed signals occupying a repetitive sequential position in the transmit bit stream;

¹¹ Once again, InterDigital is asserting *inter alia* claim 8 of the '089 patent which is dependent from, and therefore incorporates, claim 1. As discussed above, claim 1 *per se* of the '089 patent was cancelled during the reexamination.

transmitter and receiver means both at said base stations and at said subscriber for providing direct communication between said base stations and said subscriber stations over the said radio frequency (RF) channels; and

each subscriber station operating in a half-duplex mode within a time division multiple access frame wherein it transmits in one portion of said frame and receives in another portion of said frame. [Emphasis added.]

and claim 1 of the '705 patent provides:

1. A digital wireless system comprising a base station in communication with telephone lines and a plurality of subscriber stations for the simultaneous transmission of information signals over radio frequency (RF) channels between the base station and each of said plurality of subscriber stations, comprising

conversion means at said base station for respective connection to said telephone lines for converting the analog information signals received from said telephone lines into digital signal samples and for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines;

signal compression means connected to said conversion means for simultaneously compressing separate digital signal samples derived from said conversion means to provide separate compressed signals;

channel control means connected to said signal compression means for sequentially combining the compressed signals into a single transmit bit stream, with each of the respective compressed signals occupying a respective sequential position in the transmit bit stream;

transmitter and receiver means both at said base station and at said subscriber stations for providing direct communication between said base station and said subscriber stations over the said radio frequency (RF) channels; and

means to determine synchronization between the base station and the subscriber stations utilizing a code for exchanging the current state of the connection therebetween the link quality and the power and timing adjustments. [Emphasis added.]

2. Construed as Means-Plus-Function Elements

The parties agree that the "conversion means" element (as well as the other "means-plus-function" elements in the claims) should be construed under 35 U.S.C. § 112(6):

SPECIAL MASTER: Let me – actually, let me stop you right there. Is it Inter-Digital's position that all of the means plus function clauses in the claims should be construed under 112, paragraph 6?

MS. ADDISON: Yes.

Transcript at 31, Ericsson's Post-Hearing Brief at 8. Although both parties agree that these "conversion means" elements are drafted in means-plus-function form, and therefore require interpretation under 35 U.S.C. § 112(6), the Federal Circuit in *Radtime PLC v. Seagate Technology, Inc.*, 174 F.3d 1294 (Fed. Cir. 1999), *cert. denied*, 120 S.Ct. 933 (2000), cautioned that the trial court is required to construe the disputed claims-at-issue regardless of what the parties may have agreed. *But see Smith's Industries Medical Systems, Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1357 (Fed. Cir. 1999) (noting that neither of the parties had objected to the district court's holding that a claim limitation should be construed under § 112(6) and that the court would therefore "proceed accordingly.").

35 U.S.C. § 112(6) provides that:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Section 112(6) allows "an applicant [to] describe an element of his invention by the result accomplished or the function served, rather than describing the item or element to be used * * *." *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 27 (1997). The three general hallmarks of a means-plus-function element are: (1) the element is expressed in terms using "means" or "step" which raises a presumption that there was an intent to invoke § 112(6), *Al-Site Corp. v. VSL Int'l, Inc.*, 174 F.3d 1308, 1318 (Fed. Cir. 1999) ("If the word 'means' appears in a claim element in combination with a function, it is presumed to be a means-plus-function element"), *see also Granberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1584 (Fed. Cir. 1996); (2) a specified function follows the "means" or "step" and is linked to the "means" or "step," *York Products, Inc. v. Central Tractor Farm & Family Co.*, 99 F.3d 1568, 1574 (Fed. Cir. 1996); and (3) there is no definite structure, material or acts set out in the claim for achieving the specified function. *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524 (Fed. Cir. 1996), *cert. denied*, 522 U.S. 812 (1997). "Means-plus-function" limitations are construed, as required by § 112(6), to cover the corresponding structure, material or acts described in the specification and equivalents thereof. *In re Donaldson*, 16 F.3d 1189 (Fed. Cir. 1994) (*en banc*).

The "conversion means" elements of claim 1 of the '089 patent and claim 1 of the '705 patent use the word "means" followed by a specified function that is linked to the "means." According to the terms of the claim, that "conversion means" is located "at said base station for respective

connection to said telephone lines" and has two recited functions, namely (1) "for converting the analog information signals received from said telephone lines into digital signal samples," and (2) "for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines." The terms of the claims recite no definable "structure," and the record does not reveal or support a conclusion that "conversion" would evoke any category or variety of structures known as a "conversion." Cf., *Personalized Media Communications, L.L.C. v. United States Int'l Trade Comm'n*, 161 F.3d 696 (Fed. Cir. 1998). Accordingly, the special master agrees with the parties that this element should be construed as a means-plus-function element under § 112(6).

Markman-type claim construction of a means-plus-function element requires that the court identify the stated function and the corresponding structure, material, or acts described in the specification. See *Overhead Door Corp. v. Chamberlain Group, Inc.*, 194 F.3d 1261 (Fed. Cir. 1999); *Chierinatta Concrete Concepts, Inc. v. Cardinal Industries, Inc.*, 145 F.3d 1303, 1306 (Fed. Cir. 1998).

3. The Parties' Proposed Construction

The parties' have proposed the following respective constructions for the "conversion means" element of claim 1 of the '705 patent:

InterDigital's Proposed Construction

A conversion mechanism at the base station. The conversion mechanism is connected to the telephone lines. The conversion changes analog information signals that are received from the telephone lines into digital signal samples. The conversion also changes digital signal samples received from the subscriber stations into analog information signals which may be sent over the telephone lines.

The recited function is converting analog information signals received from telephone lines into digital signals and converting digital signals received from subscriber stations into analog information signals that may be sent over telephone lines.

The corresponding structure is conversion devices contained in PBX 15 and equivalents thereof.

Ericsson's Proposed Construction

The conversion means is located at the single base station.

The recited function of this "means-plus-function" element is converting between analog telephone signals and digital signals.

The disclosed structure is A/D and D/A converter pairs within a PBX at the base station. The converter pairs convert analog signals to/from 64 Kbps μ -law companded digital signals. Each A/D-D/A converter pair is connected to an analog telephone line.

4. The Actual Dispute

Although it is not entirely clear from the above proposed constructions, the crux of the parties' dispute focuses on the term "analog information signals," and whether construction of the claim would permit "digital-to-digital conversion," *i.e.*, whether "analog information signals" can be in either analog or digital format as long as those signals contain voice information. The query becomes whether "analog" refers to content or format.

During the *Markman* hearing, counsel for InterDigital explained InterDigital's position:

MS. ADDISON: Let me also address another legal issue that is logical to me even though I'm interrupting my flow.

* * * * *

The next issue that arises still at the base station level is the external information network. This base station has got to take information in, in some form. The specification provides that it can be voice, data, computer, analog, digital. But I can tell you Ericsson disputes that. Ericsson is saying it is limited to analog.

So before we even get into the system, we've got another overarching issue, which is: Is digital input precluded? The system --

SPECIAL MASTER: Let me ask you about that. The patent says that the PBX actually changes -- digitizes the signals coming in, right?

MS. ADDISON: No, it does not say that.

SPECIAL MASTER: It does not say that.

MS. ADDISON: It does not say that. In Ericsson's construction, it says that.

SPECIAL MASTER: Okay.

MS. ADDISON: The patent says certain of the claims have a conversion feature. And the conversion feature, Ericsson says, is limited to an analog-to-digital conversion. They're relying on the preferred embodiment, and they are also relying on extrinsic evidence about the preferred embodiment and what it could and couldn't do. The patent does not --

SPECIAL MASTER: Okay. I asked it, perhaps, incorrectly then. In the specification, in the preferred embodiment, does the PBX convert the form from analog to digital?

MS. ADDISON: If the information comes in, in analog form, in the PBX there are devices that will perform an analog-to-digital conversion. One of the items of contention in this case is: What happens if the information comes in, in digital form? In which case, we believe that the specification demonstrates that there will be a digital-to-digital conversion. So, the patent does not limit conversion to analog to digital.

SPECIAL MASTER: Do you have a reference to that in the specification, where it says that?

MS. ADDISON: Yes, Your Honor. The authority on which we are relying, Your Honor – and it just so happens that the page that my colleague handed me is from the '705. The language is in all of the four Paneth patents. If Your Honor has the '705 in front of you and can turn to Column 1.

SPECIAL MASTER: All right.

MS. ADDISON: Line 27. The base station is interconnected with an external information network which may be analog and/or digital.

SPECIAL MASTER: Oh, yes.

MS. ADDISON: And what is disclosed is a generic switch. The switch is not limited to an analog switch. Ericsson's argument that the switch is limited to an analog switch is based exclusively on attempting to read function from the preferred – or structure from the preferred embodiment into the specification.

SPECIAL MASTER: Well, actually, that was my question. In the preferred embodiment – actually, I'm looking at the bottom of column 7 to the top of column 8. Isn't there a discussion of the – in the preferred embodiment, again, of the PBX digitizing the input information?

For example, at the top of – in the top of column 8, it refers to "from this point on the voice information is processed in a digital format."

MS. ADDISON: Yes. There is really not – I don't think there's any dispute that the call flow requires information to be converted to a form that will allow the information signal to be reduced from 64 kilobits per second to less than 16. I mean, that's got to be done. But it's our position that as the information comes in, in digital form, that there can be a bipolar-to-unipolar conversion, that it might need to be sampled. So a lot of different cases –

SPECIAL MASTER: Okay. Let me just stop you right there.

Other than what you referenced in column which I'm very familiar with, that says the input can be digital or analog, the other processing that you just referred to, where is that in the specification?

MS. ADDISON: The reduction of the information or the processing from 64 kilobits per second?

SPECIAL MASTER: No, I've got that. That's right at the top of column 8, it talks about that. The other types of processing. In other words, other than in column 1, where in the specification does it talk about taking digital input and then doing something to it?

MS. ADDISON: I don't believe that the – excuse me just a minute.

SPECIAL MASTER: Sure.

MS. ADDISON: I believe that the question, Your Honor, is what would this specification disclose to one skilled in the art; and it is our position that one skilled in the art would take the disclosure of a generic switch to accommodate either analog-to-digital or digital-to-digital conversion.

There is not an explicit recitation of digital-to-digital conversion in this specification.

SPECIAL MASTER: All right.

MS. ADDISON: We intend, Your Honor, to address this with the testimony of Dr. Levesque.

SPECIAL MASTER: I got you off track. I'm sorry.

MS. ADDISON: But – well, you got me off track, except I'm now finished with another block on my diagram. So, thank you.

But once again, you've gone right to the heart of the conversion issue. One of them is where – in those claims that we cite a conversion, does it have to – does it have to be analog to digital or digital to digital? And also, Ericsson is trying to limit its analog to converter pairs.

* * * * *

Transcript at 23-28. InterDigital thus argues that “[t]he adjective ‘analog’ in ‘analog information signals’ describes the signals’ content rather than their format,” InterDigital’s Post-Hearing Brief at 6, while Ericsson argues that “the phrase refers to information signals in analog format.” Ericsson’s Post-Hearing Brief at 8.

Ericsson points to the language of the claims, the prosecution history of the ‘863 patent (indeed, the same prosecution history discussed above), expert testimony during the *Markman* hearing, and arguments InterDigital presented during the *Motorola* litigation. Ericsson notes, for example, that the claims call for converting “analog information signals” into “digital signal samples.” Thus, the converted signals are referred to as “digital signal samples.” If InterDigital’s construction was correct, Ericsson argues, namely that any analog or digital signals containing voice information were “analog information signals,” then such signals would continue to contain voice information after conversion and would still be “analog information signals.” Ericsson’s Post-Hearing Brief at 9. Ericsson also argues that the last portion of the “conversion means” element supports its position, namely that the “conversion means” also has the function of “converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines.” Here, Ericsson notes that “analog signals” clearly refers to the format, not the content.

InterDigital responds that digital signal samples are "samples of analog information signals in the unipolar format of the base station," and that the "recited function is converting the analog information signals from and to such digital signal samples." InterDigital's Post-Hearing Brief at 6. InterDigital further argues that the last portion of the "conversion means" element would be understood by one of ordinary skill in the art "as a simple shorthand of the mirrored forward process." *Id.*

5. The Specification

The specification of the '089 patent explains that:

Connection between the PSTN and the subscriber stations are established and maintained in the private branch exchange (PBX) 15 which is resident in the base station. The PBX 15 is a model UTX-250 system, an off-the-shelf product developed by the United Technologies Building Systems Group. Many of the existing features of the generic PBX system are utilized in the control of Telco interfaces required in the system of the present invention. The PBX 15 also converts voice information to/from the PSTN to 64 Kbps μ -law companded pulse coded modulation (PCM) digital samples. From this point on, the voice information is processed in a digital format throughout the base station and the subscriber stations, right up to the interface circuitry connecting to the subscriber telephone, or as far as the subscriber transmitter and receiver permits.

(Col. 7, line 60-col. 8, line 7) That was the portion of the specification that counsel for InterDigital was referring to above, and which is reproduced here for ease of reference:

SPECIAL MASTER: Well, actually, that was my question. In the preferred embodiment – actually, I'm looking at the bottom of column 7 to the top of column 8. Isn't there a discussion of the – in the preferred embodiment, again, of the PBX digitizing the input information?

For example, at the top of – in the top of column 8, it refers to "from this point on the voice information is processed in a digital format."

MS. ADDISON: Yes. There is really not – I don't think there's any dispute that the call flow requires information to be converted to a form that will allow the information signal to be reduced from 64 kilobits per second to less than 16. I mean, that's got to be done. But it's our position that as the information comes in, in digital form, that there can be a bipolar-to-unipolar conversion, that it might need to be sampled. So a lot of different cases –

Transcript at 26. Thus the conversion, InterDigital says, is of voice information, *i.e.*, content, rather than format. InterDigital also draws support from the disclosure in the specification that the "base

station is interconnected with an external information network, which may be analog and/or digital," and that the "information signals are selected from the group consisting of voice, data, facsimile, video, computer and instrumentation signals." (Col. 1, lines 24-28) Counsel also, however, conceded that there was no disclosure in the specification of digital-to-digital conversion:

SPECIAL MASTER: Okay. Let me just stop you right there.

Other than what you referenced in column which I'm very familiar with, that says the input can be digital or analog, the other processing that you just referred to, where is that in the specification?

MS. ADDISON: The reduction of the information or the processing from 64 kilobits per second?

SPECIAL MASTER: No, I've got that. That's right at the top of column 8, it talks about that. The other types of processing. In other words, other than in column 1, where in the specification does it talk about taking digital input and then doing something to it?

MS. ADDISON: I don't believe that the - excuse me just a minute.

SPECIAL MASTER: Sure.

MS. ADDISON: I believe that the question, Your Honor, is what would this specification disclose to one skilled in the art; and it is our position that one skilled in the art would take the disclosure of a generic switch to accommodate either analog-to-digital or digital-to-digital conversion.

There is not an explicit recitation of digital-to-digital conversion in this specification.

Transcript at 26-27.

Ericsson reads the specification differently. Ericsson notes that when the specification refers to analog versus digital, *eg*, in the disclosure that the "base station is interconnected with an external information network, which may be analog and/or digital," the reference is to format, not content. Ericsson's Post-Hearing Brief at 9. Also, the above quoted portion of the specification from column 7, Ericsson notes, discloses that "From this point on," *i.e.*, after the PBX, "the voice information is processed in a digital format * * *," thus once again referring to format, rather than content. Ericsson further points out that when referring to a digital-to-digital data mode in the subscriber telephone unit, the specification uses the phrase "reformatted data" rather than "conversion" or "converted." *Id.*

Over all, the specification provides at least some support for both parties' arguments and is not decisive, although the specification in general tends to favor Ericsson's position. Thus, once again, it is appropriate to consult the prosecution history.

6. Prosecution History

The original claims in an application also constitute part of the original disclosure. As noted above, the application maturing into the '089 patent (the '045 application) was filed as a continuation of the application, then-pending, that matured into the '863 patent. The cover sheet accompanying the filing of the '045 application included directions to cancel original claims 14-31. Those claims were allowed less than two weeks earlier during the prosecution of the application for the '863 patent.¹²

The application maturing into the '863 patent was originally filed with 31 claims, of which claims 1, 14 and 23 were independent. The '045 application was filed as a continuation application under 37 C.F.R. § 1.60 (a "Rule 60 continuation"), and thus as filed was a "complete copy of" the parent application for the '863 patent, including the original claims. Original claim 1 in the '045 application was, of course, the same claim 1 that was originally presented in the application for the '863 patent, and called for:

1. A system for the wireless transmission of multiple information signals utilizing digital time division circuits between a base station and a plurality of subscriber stations, said subscriber stations being selectively fixed or movable.

Original claims 3-5 in the '045 application, as in the parent, called for:

3. The system of Claim 1, wherein said base station is interconnected with an external information network.
4. The system of Claim 3, wherein said external network is an analog network.
5. The system of Claim 3, wherein said external network is a digital network.

Those claims are, of course, consistent with that portion of the specification reproduced above, namely that the "base station is interconnected with an external information network, which may be analog and/or digital." (Col. 1, lines 24-26) From the disclosure and the original claims, there seems

¹² The Notice of Allowability, Paper No. 13, in the application for the '863 patent, allowing claims 14-31 and renumbering them as patent claims 1-18, is dated March 16, 1987. The '045 application was filed on March 27, 1987, eleven days later.

that there can be little, if any, doubt that the written description discloses that the base station is connected to either an analog or digital external network.

Original claim 8 in the '045 application, as in the parent, called for:

8. The system of Claim 1, wherein said information signals are selected from the group consisting of voice, data, facsimile, video, computer and instrumentation signals.

That claim is thus consistent with the specification that describes, using identical terms, that the "information signals are selected from the group consisting of voice, data, facsimile, video, computer and instrumentation signals." (Col. 1, lines 26-28)

It should be noted at this stage that the specification common to the '863, '089 and '705 patents nowhere refers to "analog information signals." As in original claim 8 and the excerpt from the specification above, the specification simply refers to "information signals" without specifying whether those signals are analog or digital. The specification also teaches that the "information signals" received from the telephone company trunk lines are converted by "conversion devices" into "digital signal samples:"

The base station operates over a plurality of RF channel pairs. Each channel pair operation is implemented by the combination of a transmit channel circuit for processing a given plural number of information signals received simultaneously over telephone company trunk lines for simultaneous transmission to different subscriber stations over a given radio frequency (RF) channel, and a receive channel circuit for processing a plurality of signals received simultaneously over a given RF channel from different subscriber stations to provide information signals for transmission over the trunk lines.

Separate conversion devices are respectively connected to each of the trunk lines for converting the information signals received over the trunk lines into digital signal samples. [Emphasis added.]

(Col. 1, lines 38-53) Indeed, original claim 14 in the specification common to the '863, '089 and '705 patents, which issued as claim 1 in the '863 patent, called for:

separate conversion means for respective connection to said trunk lines for converting the information signals received over said trunk lines into digital signal samples

using language patterned after the specification. The phrase used in both the specification and claim 14 was "information signal" with no further description of whether it was digital or analog. That

provides some indication that "analog information signals" in claim 1 of the '089 and '705 patents was intended to be a reference to a specific type of "information signal," namely one in analog format.

The specification also, as Ericsson notes, draws a distinction between "analog" and "digital" in contexts that are clearly referring to format. One example is the above quoted excerpt from column 1, lines 24-26 of the specification and original claims 3-5. There are others, of which the following are but a few.

- "This provides both a spectral and an economic advantage over existing analog radio-phone systems which can provide for only one conversation at a time on a given frequency channel." (Col. 3, lines 30-33)
- "Switching among Telco (telephone company) trunk lines and the TDM slots on the selected channel is accomplished by the base station using preferably a digital switch, although it is possible to substitute an analog switch." (Col. 7, lines 28-32)
- "The modem transmitter modulator section uses an FIR digital filter to create a digital representation of the waveform which is used to modulate the RF carrier. The resultant digital stream is converted to analog format and mixed to an IF transmit frequency of 20.2 MHz. The signal is then sent on to the RFU for filtering, further conversion to RF and amplification prior to transmission." (Col. 12, lines 42-49)
- " * * * This signal is down-converted to baseband, then digitized with an A/D [analog to digital] converter¹³ function. The resultant digital samples are processed by a microprocessor-based signal processing unit. * * * The signal processing unit also functions in a self-training mode, which is used to teach the processing unit the imperfections of the analog filters used in the receive stream. * * * the demodulator digital equalization process compensates the input samples for these imperfections in the analog filter components. This technique allows the use of less expensive lower-tolerance analog components and adds to the overall system ability to demodulate weak or noisy signals." (Col. 12, lines 50-68)
- "In its basic mode of operation the STU acts as an interface unit to convert the 2-wire analog signal interfaced from a standard telephone set to 64 Kbps PCM encoded digital samples. * * * The signal outputs of the SLIC 53 on line 54 are analog voice-frequency (VF) transmit and receive signals. These are subsequently converted to PCM samples by a PCM codec 55. The PCM codec 55 uses the μ -255 companding algorithm to digitize the voice signals

¹³ In Col. 5, there is "Glossary of Acronyms" that defines "A/D" as "Analog-to-Digital Converter" and "D/A" and "Digital-to-Analog Converter."

into 8-bit samples at an 8 KHz rate. * * *. The digitized voice samples are then fed over line 56 * * *." (Col. 41, lines 38-63)

- "In the modem receiver section, the mixer 138 mixes an analog waveform received from the RFU on line 150 via a 20 MHz bandpass filter (not shown) with a 20 MHz IF signal on line 151 to down convert the analog signal to baseband on line 152. The analog signal is then converted by the A/O converter 139 to a digital signal on line 153 which is buffered in the FIFO stack 140 for processing by the microprocessor 141." (Col. 63, lines 40-51)

The specification is lengthy (occupying 72 columns in the printed '089 patent), however, the foregoing is believed to be representative. In any event, InterDigital has not identified any portion in the specification where "analog" in particular has been used to designate something other than format.

The remainder of the prosecution history likewise suggests that "analog" in "analog information signal" was intended to mean an analog format. As originally filed, the claims of the '045 application clearly stated that the external network could be analog or digital, and that the "information signals" could be voice, data etc. In a preliminary amendment filed on the same day as the '045 application, InterDigital cancelled claims 6 and 7, and added claims 32-45. Claim 32 was independent, and claims 33-45 were dependent either directly or indirectly on claim 32. In a first Office action, all pending claims, namely claims 1-5, 8-13 and 32-43 were rejected on various grounds, including unpatentability under § 103 over several references. In a responsive amendment, InterDigital cancelled a number of claims including the only two then-pending independent claims, namely 1 and 32. InterDigital then added independent claim 44 and dependent claim 45. The remaining claims were amended to depend directly or indirectly from claim 44. Independent claim 44 called for, in part:

conversion means for respective connection to said telephone lines for converting the information signals received over said telephone lines into digital signal samples * * * [Emphasis added.]

That, of course, tracks the language of original claim 14 and the specification. Once again, there was no analog or digital qualification. InterDigital did, however, remark that "[c]laim 44 is clearly patentable over Karlstrom [one of the previously applied references] because the Karlstrom system does not disclose either digital conversion means * * *." Amendment, Paper No. 7, at 4-5. That, however, was only one of several distinctions InterDigital advanced.

Despite the foregoing amendment, the PTO again rejected all pending claims in the '045 application on several grounds, including § 103 and certain prior art. Office action dated May 26, 1988. Claim 44, along with other claims, was rejected under § 103 as being unpatentable over U.S. Patent No. 4,567,591 to Gray et al. The examiner reasoned, in part, that "Gray et al. teaches in figure 1 a conversion means (104), a signal compression means (106) * * *. Gray et al. fails to show telephone lines as inputs to source encoders (104) in the base station but it would have been obvious to use telephone lines to carry the audio signals to the inputs since telephone lines commonly carry audio signals." Office action at 2-3.

The file history indicates that there was a telephone interview between the examiner and the applicant's attorney, Mr. Jacobs, on June 30, 1988. Paper No. 9. The "Examiner Interview Summary Record states: "Proposed claims 47 to 48 appear allowable over art of record but will be thoroughly reviewed upon filing of amendment. A dependent claim to details of three branch diversity would also appear to be allowable." *Id.*

On July 7, 1988, InterDigital filed an amendment that *inter alia* cancelled claim 44 and added independent claim 46 and other dependent claims. Claim 46 was similar to claim 44, but there were differences. One of those differences appears in the "conversion means" element. Claim 46 called for:

conversion means at said base station for respective connection to said telephone lines for converting the analog information signals received from said telephone lines into digital signal samples and for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines. [Emphasis added.]

Amendment at 2. In remarks accompanying that amendment, InterDigital stated:

Applicants have now cancelled claim 44 as the main claim and have substituted claim 46 (proposed claim 47 discussed with the examiner during the interview). It is believed that this claim is allowable over the prior art and more particularly over Gray et al. because Gray et al. is concerned only with a satellite system where signals are sent up to a satellite [sic.] and then down to a receiver, but there is no two-way communication in a local loop system between a base station and a plurality of subscriber stations, nor do Gray et al. utilize TDMA, only TDM. * * *

There are no reasons given for the change from "information signals" to "analog information signals," but that change is nevertheless readily evident from the claims. Claim 46 became claim 1 of the '089 patent. Presumably something prompted the patentees to change "information signals" to "analog information signals," but whatever it was remains at this stage a mystery.

The phrase "analog information signals" was also added during prosecution of the '705 patent, but again without explanation. The application leading to the '705 patent (the '651 application) was filed on March 16, 1989, as a "Rule 60" continuation of the '045 application, and thus was again a "complete copy" of the parent, *i.e.*, containing original claims 1-43 as in the '045 application. The transmittal form for the '651 application requested cancellation of all claims except claim 1. Joint Exhibit 8 at JME 00359-60. In a preliminary amendment also filed on March 16, 1989, InterDigital added independent claim 44 and dependent claims 45-47. *Id.* at JME00481-82. With a minor amendment,¹⁴ claim 44 became claim 1 of the '705 patent.¹⁵ Claim 44 as originally presented therefore had the "conversion means" element as it appears in the claim 1 of the '705 patent, *i.e.*, it contained the phrase "analog information signals."

7. Discussion

InterDigital is correct in asserting that "analog" in "analog information signals" is an adjective. InterDigital's Post-Hearing Brief at 6. InterDigital's further argument that "analog" refers to signal content rather than format, however, in light of the foregoing, is not fairly supported by the language of the claims and the specification, including those portions of the specification that InterDigital relies on.

As noted above, it is clear from the explanation in the specification that the written description discloses that the base station is connected to either an analog or digital external network. (Col. 1, lines 24-26) That is further confirmed by original claims 3-5, as discussed above. In referring to the external network and throughout the specification, "analog" clearly, and consistently, refers to

¹⁴ A later amendment changed "comprising" to "utilizing" in the last "means to determine synchronization" element. Joint Exhibit 8 at JME 00500.

¹⁵ In an Office action dated September 28, 1989, the PTO rejected claims 1-5, 8-13, and 32-47 on various grounds. The examiner apparently did not notice that claims 2-43 had been cancelled. There was no prior art rejection applied against claims 44-47, although the examiner rejected those claims under § 112(2) on indefiniteness grounds. In a subsequent amendment, InterDigital cancelled claim 1, and noted that the other rejected claims, other than claims 44-47, should have been cancelled with the filing of the continuation application. Joint Exhibit 8 at JME 00500-501.

format as opposed to content. It is also clear from the specification that the term "information signals" refers to content which, according to the specification, may consist of "voice, data, facsimile, video, computer and instrumentation signals." (Col. 1, lines 26-28) That is also consistent with original claim 8. Some of those "information signals," e.g., "data," are typically in digital format. Thus, although "information signals" may reasonably be said to encompass both analog and digital format signals, "analog information signals" certainly suggests a narrower class.

In addition, in normal grammatical construction where, as InterDigital notes, "analog" is an adjective, that adjective modifies "information signals," i.e., "information signals" that are analog. Construing "analog" to refer to format is consistent with the specification. InterDigital's proposed construction, on the other hand, is not supported by any fair reading of the specification, and, as InterDigital's counsel conceded, the specification contains no written description of digital-to-digital conversion.

Further, that construction is supported by, or at least consistent with, the prosecution history. As discussed above, InterDigital initially presented independent claim 44 which called for "conversion means for respective connection to said telephone lines for converting the information signals received over said telephone lines into digital signal samples * * *." [Emphasis added.] Claim 44, however, was rejected. After an interview with the examiner, InterDigital presented claim 46 which called for "conversion means at said base station for respective connection to said telephone lines for converting the analog information signals received from said telephone lines into digital signal samples * * *." [Emphasis added.] InterDigital's remarks accompanying that amendment do not specifically address why "analog" was added as a qualifier to "information signals." Perhaps that change was prompted by the Gray et al. reference. Perhaps not. For the present purposes of claim construction, there is, on the present record, no clear indication one way or the other.¹⁶

¹⁶ It should be emphasized that the record developed during a *Markman* hearing does not, and cannot, encompass the parties' infringement allegations or defenses. The current record is therefore far less a record than one that would be developed at trial. Although prosecution history is relevant both for purposes of claim construction and for deciding prosecution history estoppel, when a *Markman* hearing is held in advance of trial, such as here, the record is simply incomplete *vis-à-vis* any assertions of infringement under the doctrine of equivalents and, accordingly, any assertions of prosecution history estoppel. Thus, any comments in this report and recommendation regarding prosecution history must be taken in context, namely in the context of a *Markman* hearing in advance of trial. Certainly no comments in this report and recommendation concerning prosecution history should be taken as in any way reflecting on prosecution history estoppel or any presumptions.

If the current issue before the court was prosecution history estoppel, then whether InterDigital changed "information signals" to "analog information signals" for purposes of patentability might be an important question. The issue before the court here, however, is claim construction; not prosecution history estoppel. Whether InterDigital is precluded by prosecution history estoppel from asserting equivalents under the doctrine of equivalents must await another day. For purposes of claim construction, InterDigital could have left "information signals" without any further qualifier, but for whatever reason chose not to. Indeed, InterDigital had several potential claiming choices available, including using dependent claims to qualify the external network as analog or digital as in the original claims. Instead, InterDigital chose to qualify "information signals" as being "analog information signals," and that is a choice InterDigital simply has to live with. See *Sage Products, Inc. v. Devon Industries, Inc.*, 126 F.3d 1420, 1425 (Fed. Cir. 1997)("[A]s between the patentee who had a clear opportunity to negotiate broader claims but did not do so, and the public at large, it is the patentee who must bear the cost of its failure to seek protection for this foreseeable alteration of its claimed structure").

Although the claim construction issue can be decided on the basis of the claims and specification alone, aided by the prosecution history, there are additional factors that support the foregoing construction. First, InterDigital's proffered expert witness, Dr. Levesque, spent much of his direct testimony on this issue criticizing Ericsson's proposed claim construction, see e.g., transcript at 165-175, which was not particularly helpful. Dr. Levesque did, however, testify that he understood "analog information signals" to mean a "subset" of "information signals:"

Q. (By Ms. Addison) Dr. Levesque, now that you have called our attention to the patent's definition of information signals, do you have – what is your understanding of how one skilled in the art would have interpreted the term "analog information signals" as of the relevant time?

A. Well, I didn't see that full phrase "analog information signals" specifically defined in a sentence or paragraph anywhere in the patent. But information signals was clearly defined. Therefore, I took analog information signals to mean a subset of what the patent calls information signals. That seemed logical to me. And that analog subset I interpreted to include voice signals, perhaps video signals, but, in any case, a subset that would certainly include voice signals. [Emphasis added.]

Transcript at 171-172. Although Dr. Levesque in his final report dated November 3, 1999, InterDigital Exhibit 2 at 6, reasoned that an "analog voice signal" arriving from a trunk line could already

be PCM-encoded, during cross-examination Dr. Levesque confirmed that in an earlier draft of that report, dated October 7, 1999, he had construed the signals arriving from the PSTN as "analog signals."

Signals that arrive from the PSTN are called analog signals, and these must be converted to digital form for transmission over the cellular radio system. This conversion is done in two steps. The first step is conversion from analog signal form to a sequence of digitized samples, that is, signal samples converted to a numerical representation. The second step is called compression and it uses mathematical operations to squeeze the digitized samples down to a lower bit rate, so as to efficiently use the radio bandwidth of the system.

In the cellular subscriber station, the digital radio signal is demodulated back to a digital stream, and that stream is in turn converted back to an analog signal, for example, a voice signal, that is essentially the same as the analog signal that arrived from the PSTN.

Ericsson Exhibit 701 at 3. At the time of the October 7th draft, Dr. Levesque testified that he had spent approximately 200 hours of time on the project.:

Q. Do you think that by the time you created this document on October 7th of 1999 that you had spent about 200 hours investigating, doing your work through the period you billed through October?

A. Yes, that sounds about right, encompassing all of the work that I had done on the assignment.

Q. It was about 200 hours up to that point?

A. That sounds about right.

Q. I have, for convenience, re-created this slide -- and you can look at the small screen -- with the words that you typed before you added the handwriting. This fifth paragraph reflects your thoughts about the IDC system patents as of October 7, correct?

A. Yes. That was, at least, my preliminary thoughts regarding the patents, correct.

Q. After 200 hours of work?

A. Yes, but not 200 hours of work reviewing the Ericsson claim charts.

Transcript at 407-410. The October 7th draft report was obviously superseded by Dr. Levesque's later November report and thus has limited probative value. Nevertheless, 200 hours of work sug-

gests that draft resulted from at least some concentration and study, particularly given Dr. Levesque's background and expertise in the field, and even taking into account Dr. Levesque's further testimony that some portion of that time was devoted to explaining the technology to counsel. Transcript at 435-36. Further, even fully crediting Dr. Levesque's testimony on re-direct that his earlier draft was in effect a "checklist" or outline of topics for further discussion, transcript at 438-441, Dr. Levesque nevertheless testified, as reproduced above, that the draft report reflected his "preliminary thoughts." Dr. Levesque was given the opportunity to reject that suggestion, but he did not.

Also, during the *Motorola* litigation, in the United States District Court for the District of Delaware, InterDigital filed a "Memorandum of InterDigital Technology Corporation in Support of Its Motion to Alter or Amend Judgment, for Judgment as a Matter of Law or, in the Alternative, for a New Trial," Ericsson Exhibit 149, in which InterDigital characterized claim 1 of the '089 patent as follows:¹⁷

Claim 1 of the '089 patent is directed to a system including a base station and the subscriber station. The key limitations of claim 1 are the analog-to-digital "conversion means," "compression means," "channel control means," (all located at the base station), "transmitter and receiver means" located at both the base station and subscriber station, and the feature of half-duplex operation of the subscriber station, that is, where the subscriber station transmits in one portion of a time division multiple access frame and receives in another portion of the frame. An analog to digital converter converts analog information signals into digital signal samples, while a digital to analog converter converts decompressed digital signals received from the wireless subscriber stations into analog signals for transmitting to a PSTN side landline telephone subscriber * * *.

Dr. Birch described in detail how claim 1 reads on a system containing the Ericsson base station and a Motorola USDC phone. He explained how analog-to-digital conversion is performed in the PSTN and that this is equivalent under the Doctrine of Equivalents to performing it at the base station * * *. In each instance, the analog telephone signal which originates from a landline subscriber is converted into digital form. The location of this conversion is immaterial with respect to operation of the system. * * *. [Emphasis added. Transcript citations omitted.]

¹⁷ The *Motorola* litigation is also the subject of Ericsson's contention that InterDigital is judicially estopped from taking a contrary or inconsistent position in this litigation. That issue has been separately briefed by the parties and will be the subject of a separate report and recommendation.

Id. at 24-25. InterDigital repeated that argument in its appeal to the Federal Circuit:

Claim 1 of the '089 patent describes a digital wireless communication system, including both a base station and subscriber set. * * * After explaining the preamble of claim 1, Dr. Birch addressed the first of the five elements in claim 1, the "conversion means." Dr. Birch explained that conversion means consists of an analog to digital conversion of incoming signals and digital to analog conversion of outgoing signals * * *. Turning to the diagram of the accused products, he went on to explain that while conversion can occur in the PSTN before reaching the base station, the Ericsson base station * * * is capable of performing the analog-to-digital and digital-to-analog conversion * * *. Dr. Birch also explained that conversion in the PSTN is equivalent to conversion in the base station. Whether the conversion is in the PSTN or in the base station, the same function is performed in the same way with the same results, simply at a different location. * * * [Emphasis added. Transcript citations and footnote omitted.]

It is thus clear that InterDigital was asserting that the "conversion means" of claim 1 of the '089 patent effected analog-to-digital conversion (or the reverse for outgoing signals), and if that conversion occurred in the PSTN then infringement was asserted under the doctrine of equivalents.

As noted above, the '863 patent was also at issue in the *Motorola* litigation. Claim 1 of the '863 patent (original application claim 14), calls for:

separate conversion means for respective connection to said trunk lines for converting the information signals received over said trunk lines into digital signal samples;

In a "Reply Memorandum of InterDigital Technology Corporation in Support of Motion to Alter or Amend Judgment, For Judgment as a Matter of Law or, in the Alternative, for a New Trial," Ericsson Exhibit 150, InterDigital argued that "[a]s pointed out in ITC's¹⁸ main brief, only the claims of the '089 and '705 patent are limited to an 'analog-to-digital' converter by the very terms of these claims. The claims of the '863 and '375 patents are not so limited." *Id.* at 4.

Thus, Dr. Levesque's "preliminary thoughts" that signals in analog form from the PSTN are converted to digital form were shared by InterDigital during the *Motorola* litigation. As a side note, although Dr. Levesque was given copies of the opinions of the district court and the Federal Circuit in the *Motorola* litigation, he was not, apparently, given copies of the foregoing briefs:

¹⁸ "ITC" refers to InterDigital.

Q. When the InterDigital lawyers gave you the opinions of the district Court and the Court of Appeals, did they give you a copy of this brief?

A. No, they did not. This is the first time I've seen this document.

Q. Did the InterDigital lawyers mention to you in the course of the part of two days of discussion that you had with them sometime in October of 1999 that prior experts of InterDigital's, Dr. Birch, had explained that conversion means consists of an analog to digital conversion of incoming signals and digital to analog conversion of outgoing signals?

A. No. We had no discussion like that.

Transcript at 420.

8. Recommendation – “analog information signals”

Therefore, as an initial matter, the special master recommends that the Court construe “analog information signals” in claim 1 of the '089 and '705 patents as:

The phrase “analog information signals” in claim 1 of the '089 and '705 means information signals in analog format.

9. Recommendation – Corresponding Structure

The second task is to identify the “corresponding structure” disclosed in the specification. InterDigital says that the “corresponding structure” is “conversion devices contained in PBX 15 and equivalents thereof.” Ericsson says, as set out in the parties' proposed interpretations above, that the disclosed structure is “A/D and D/A converter pairs within a PBX at the base station. The converter pairs convert analog signals to/from 64 Kbps μ -law companded digital signals. Each A/D-D/A converter pair is connected to an analog telephone line.”

On this issue, the specification is sparse. The specification simply says that “PBX 15 also converts voice information to/from the PSTN to 64 Kbps μ -law companded pulse coded modulation (PCM) digital samples.” (Col. 7, line 68-Col. 8, line 2) The specification further states that the “PBX 15 is a model UTX-250 system, an off-the-shelf product developed by the United Technologies Building Systems Group.” (Col. 7, lines 63-65) The specification goes on to say that “[m]any of the existing features of the generic PBX system are utilized in the control of Telco interfaces required in the system of the present invention.” (Col. 7, lines 65-68) InterDigital urges that is a disclosure of an generic switch. InterDigital's Post-Hearing Brief at 7. But that is not what the specification actually says. The specification says that “PBX 15 is a model UTX-250 system,” and the sec-

ond sentence characterizes the model UTX-250 system as being generic. Whether it actually is, or not, is unknown on this record.

Dr. Levesque's testimony on behalf of InterDigital once again was not particularly helpful, but nevertheless accurate:

Q. What did you determine the corresponding structure that performs the reciting function is?

A. Well, what was – what was called out in the patent indicated here are really unspecified conversion devices that are contained in the PBX. [Emphasis added.]

Transcript at 168-169. Also, Dr. Levesque's report simply said that the "structures disclosed in the '089 patent that perform this function are conversion devices contained in the PBX 15." InterDigital Exhibit 2 at 12.

Ericsson's proposed corresponding structure, on the other hand, is actually derived from portions of the specification that describe the subscriber unit. Ericsson's Post-Hearing Brief at 11-12. The "conversion means" element of claim 1 in both the '089 and '705 patents, however, specifically locates that "means" "at said base station." Although the specification states that the "subscriber station's function is very similar to that of the base station," and that the "associated function in the base station [of the 'subscriber telephone interface unit (STU)' in the subscriber station] is performed by the PBX module," (Col. 9, lines 16-17, 27-29) that does not mean that the structure is the same. The subscriber stations are plainly not PBXs and vice-versa, even though both may perform similar or even identical functions. The task here is to locate the structure, if any, at the base station for performing the recited functions of "for converting the analog information signals received from said telephone lines into digital signal samples and for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines."

The only "structure" disclosed at the base station for performing the recited functions is, as Dr. Levesque accurately observed, some "unspecified conversion devices" that are contained in PBX 15. PBX 15, in turn, is disclosed as a model UTX-250 system. The specification does not say that PBX 15 may be a generic PBX system, or that the UTX-250 system is exemplary of systems that may be used. Rather, the specification says that "PBX 15 is a model UTX-250 system." Thus, the only conclusion that can be drawn is that the "structure" corresponding to the "conversion

means" is unspecified components in the UTX-250 system (if they even exist) that perform the recited functions. The additional characterization of the UTX-250 system as being generic does not change that disclosure.

In connection with this issue, both parties have argued whether the Federal Circuit's decision in *Atmel Corp. v. Information Storage Devices, Inc.*, 198 F.3d 1374 (Fed. Cir. 1999) is applicable. In *In re Donaldson*, 16 F.3d 1189 (Fed. Cir. 1994)(*en banc*), the Federal Circuit held that means-plus-function elements must be interpreted in light of the specification, and that the requirement for definiteness under § 112(2) imposed requirements on the specification for claims written in that form:

[I]f one employs means-plus-function language in a claim, one must set forth in the specification an adequate disclosure showing what is meant by that language. If an applicant fails to set forth an adequate disclosure, the applicant has in effect failed to particularly point out and distinctly claim the invention as required by the second paragraph of § 112.

The Federal Circuit further explained in *In re Dossel*, 115 F.3d 942 (Fed. Cir. 1997) that the written description requirement of § 112(2), must, of course, be satisfied regardless of whether a claim is drafted in means-plus-function format. Thus, § 112(6), according to the Federal Circuit, does not directly implicate the written description requirement. However, if the specification does not adequately describe the structure, material or acts encompassed when a means-plus-function format is used, then, according to the court, the claim is indefinite under § 112(2). The court also suggested that whether sufficient structure was disclosed in the specification should be based on the understanding of one skilled in the art.

The PTO subsequently issued proposed Supplemental Examiner Guidelines that adopted the court's reasoning in *Dossel*. Specifically, those guidelines provided:

The written description does not have to explicitly describe the structure (or material or acts) corresponding to a means- (or step-) plus-function limitation to particularly point out and distinctly claim the invention as required by 35 U.S.C. § 112 ¶ 2. Rather, disclosure of structure corresponding to a means-plus-function limitation may be implicit in the written description if it would have been clear to those skilled in the art what structure must perform the function recited in the means-plus-function limitation. [Emphasis added, footnotes omitted.]

PTO Supplemental Examiner Guidelines on Applying 35 U.S.C., § 112 ¶6, 58 Fed. Reg. 443, 444 & nn. 12 & 13 (1999). Although *Dossel* and the above guidelines focus the § 112(2) inquiry through the

eyes of one of ordinary skill in the art, the M.P.E.P. (M.P.E.P. § 608.01(p)) nevertheless limits how one may incorporate "essential material" by reference into an application:

An application for a patent when filed may incorporate "essential material" by reference to (1) a United States patent or (2) an allowed U.S. application * * *. "Essential material" is defined as that which is necessary to (1) support the claims, or (2) for adequate disclosure of the invention (35 U.S.C. 112). "Essential material" may not be incorporated by reference to (1) patents or applications published by foreign countries or regional patent offices, to (2) nonpatent publications, to (3) a U.S. patent or application which itself incorporates "essential material" by reference or to (4) a foreign application.

What happens if the "corresponding structure" supporting a means-plus-function limitation actually appears in a document that does not comply with M.P.E.P. § 608.01(p), e.g., a published article, but has been incorporated by reference into the specification? Is the resulting claim invalid under § 112(2)? In *Atmel*, the panel majority answered "not necessarily."

Atmel's patent-in-suit was drawn to a "charge pump" circuit that was used to boost voltage applied to, for example, a memory array. The sole claim in the patent called for, *inter alia*, a "high voltage generating means" which everyone agreed was in means-plus-function format and which was therefore governed by § 112(6). The drawings illustrated the high voltage generator circuit as a "black box" and the specification said that "[k]nown circuit techniques are used to implement high-voltage circuit 34. See * * * [an IEEE article – the "Dickson article"]."

The district court held that "the structure corresponding to the high voltage generating means cannot be any circuits beyond those described in the Dickson article." The district court also construed "essential material" in M.P.E.P. § 608.01(p) as including the structure corresponding to a means-plus-function limitation. The Dickson article, the district court noted, was not the type of material that could be incorporated by reference under M.P.E.P. § 608.01(p), and therefore held that the asserted claim was invalid under § 112(2) because the specification failed to disclose any corresponding structure. The district court expressly refused to consider whether the claim was indefinite based on the way the disclosure would have been understood by one of ordinary skill in the art. On appeal, the Federal Circuit reversed, but over a strong dissent by Chief Judge Mayer.

Initially, the panel majority took its "suggestion" in *Dossett* that the understanding of one of ordinary skill in the art should be part of the analysis one step farther. The panel majority held that was, indeed, the required test:

That the "one skilled in the art" analysis should apply in determining whether sufficient structure has been disclosed to support a means-plus-function limitation flows naturally from the relationship between claim construction and § 112, ¶ 2. We have previously observed that an analysis under § 112, ¶ 2 is inextricably intertwined with claim construction, * * * and that in the § 112, ¶ 6 context, a court's determination of the structure that corresponds to a particular means-plus-function limitation is indeed a matter of claim construction. * * * As it is well-established that claims are to be construed in view of the understanding of one skilled in the art, the closely related issue concerning whether sufficient structure has in fact been disclosed to support a means-plus-function limitation should be analyzed under the same standard. [Citations omitted.]

198 F.3d at 1379. The panel majority also, however, agreed with ISD "that consideration of the understanding of one skilled in the art in no way relieves the patentee of adequately disclosing sufficient structure in the specification. * * * However, interpretation of what is disclosed must be made in light of the knowledge of one skilled in the art." 198 F.3d at 1380.

The issue then facing the panel, though, was what do about M.P.E.P. § 608.01(p). The panel majority reasoned that § 112(6) "represents a *quid pro quo* by permitting inventors to use a generic means expression for a claim limitation provided that the specification indicates what structure(s) constitute(s) the means." [Emphasis in original.] 198 F.3d at 1381. Thus, § 112(6) cannot be satisfied if there is a total lack of structure: "There must be structure in the specification." *Id.* at 1382.

The panel majority also reasoned that the disclosure requirements differed between § 112(1) and § 112(6). The panel majority reasoned that "[p]aragraph 1 permits resort to material outside the specification in order to satisfy the enablement portion of the statute because it makes no sense to encumber the specification of a patent with all the knowledge of the past concerning how to make and use the claimed invention." 198 F.3d at 1382.

Section § 112, ¶ 6, however, does not have the expansive purpose of ¶ 1. It sets forth a simply requirement, a *quid pro quo*, in order to utilize a generic means expression. All one needs to do in order to obtain the benefit of that claiming device is to recite some structure corresponding to the means in the specification, as the statute states, so that one can readily ascertain what the claim means and comply with the particularity requirement of ¶ 2. The requirement of specific

structure in § 112, ¶ 6 thus does not raise the specter of an unending disclosure of what everyone in the field knows that such a requirement in § 112, ¶ 1 would entail. If our interpretation of the statute results in a slight amount of additional written description appearing in patent specifications compared with total omission of structure, that is the trade-off necessitated by an applicant's use of the statute's permissive generic means term.

198 F.3d at 1382. The panel majority agreed with ISD and the district court that the Dickson article could not take the place of structure that does not appear in the specification. However, Atmel's expert witness testified that the title of the article alone (which, of course, *did* appear in the specification) was sufficient to indicate to one skilled in the art the precise structure of the device, and that testimony, according to the panel majority, was unrebutted. Accordingly, the panel majority reversed the grant of summary judgment of invalidity.

Chief Judge Mayer wrote a strong dissent. In his view, the panel majority held "that the written description cannot adequately disclose a corresponding structure by incorporating a document fully describing this structure by reference." In Chief Judge Mayer's view, applicants should be able to incorporate descriptive material by reference in a specification irrespective of the limitations of the M.P.E.P. so long as such references are publicly available. Further, according to Chief Judge Mayer, "if those skilled in the art would understand what a 'high voltage generating circuit' is, either by reading the Dickson article or because the circuit is a well-known structure in the art, the claim is definite in accordance with § 112, ¶ 2." 198 F.3d at 1385.

Claim construction of means-plus-function elements under § 112(6) requires identification of whatever corresponding structure is disclosed in the specification. Whether that corresponding structure is sufficient to satisfy the requirements of § 112, *i.e.*, a validity issue, must await trial. Furthermore, the Federal Circuit has held in *Advanced Display Systems, Inc. v. Kent State University*, 212 F.3d 1272, 1283 (Fed. Cir. 2000), that "[w]hether and to what extent material has been incorporated by reference into a host document is a question of law," and, at least in those instances in which the question is what material, if any, has been incorporated by reference into a prior art document, "the court must determine what material constitutes the single, prior art document." The Federal Circuit also held, however, that "the standard of one reasonably skilled in the art should be used to determine whether the host document describes the material to be incorporated by reference with sufficient particularity." *Id.* Beyond the fact that adequacy of disclosure and validity are simply outside

the scope of *Markman* claim construction, the record at this stage is simply insufficient to decide those issues.

Accordingly, the special master recommends that the Court conclude that:

The corresponding "structure" disclosed in the specification for the "conversion means" in claim 1 of both the '089 and '705 patents are unspecified components in a model UTX-250 system that perform the recited functions, namely "for converting the analog information signals received from said telephone lines into digital signal samples and for converting digital signals received from said subscriber stations into analog signals for transmission to said telephone lines."

Under the terms of § 112(6), those claims should therefore be construed to cover that corresponding structure and equivalents thereof.

B. "signal compression means"

1. The Claims

Once again, the focus is on claim 1 in both the '089 and '705 patents. Both claims, using identical terms, call for:

signal compression means connected to said conversion means for simultaneously compressing separate digital signal samples derived from said conversion means to provide separate compressed signals;

Both parties agree that this element is drafted in means-plus-function format and requires construction under § 112(6). On independent review, the special master agrees. The "signal compression means" elements of claim 1 of the '089 patent and claim 1 of the '705 patent use the word "means" followed by a specified function that is linked to the "means." Accordingly, there is a presumption that § 112(6) applies. The terms of the element furthermore recite no definable "structure."

2. The Dispute

There also does not appear to be any dispute between the parties over the recited function, nor could there much dispute. The recited function is clear from the claim, namely "for simultaneously compressing separate digital signal samples derived from said conversion means to provide separate compressed signals." It is furthermore clear from the claim that the "signal compression means" is connected to the "conversion means" discussed above. The parties' dispute focuses on

the corresponding "structure." The parties also dispute whether the Federal Circuit's opinion in *WMS Gaming, Inc. v. International Game Tech.*, 184 F.3d 1339 (Fed. Cir. 1999) is applicable.

3. The Parties' Proposed Constructions

With respect to identifying the "corresponding structure" for this means-plus-function element, the parties' respective proposed constructions are:

InterDigital's Proposed Construction

The corresponding structure is two or more codecs 16 and equivalents thereof.

Ericsson's Proposed Construction

The disclosed structure is a number of codecs, one codec being connected to a specific D/A and A/D converter pair within the PBX for the duration of a particular call. Each codec implements either a RELP or SBC compression algorithm. Because this means is connected to the conversion means, which outputs μ -law companded digital signals, it inherently includes structure for changing the μ -law companded PCM digital signal samples to linear PCM digital signal samples prior to processing by the compression algorithm.

As a matter of law, the claim element cannot encompass structure implementing a VSELP or an RPE/LTP compression algorithm.

4. Discussion

The specification explains that:

Digital voice information from the PBX 15 is next processed by a voice compression system known as a codec 16, which reduces the voice information rate from 64 Kbps to approximately 14.6 Kbps or less. The codec 16 uses either a Residual Excited Linear Predictive (RELP) algorithm, as described in International Application No. PCT/US85/02168 which corresponds to co-pending U.S. application Ser. No. 667,446 entitled "RELP Vocoder Implemented in Digital Signal Processors", filed Nov. 2, 1984 and incorporated herein by reference, or an SBC encoder-decoder, as described in U.S. Pat. No. 4,048,443, to perform this voice rate compression. Typically, four codecs 16 reside in a single voice codec unit (VCU) 17 for performing voice compression for the four or more time slots in each frequency channel. Each base station VCU 17 can process four or more full-duplex voice connections for both the transmit channel and the receive channel of each channel pair. Connections by the PBX 15 determine which

voice call is processed by which VCU 17 and by which codec 16 in the selected VCU 17. The circuits of each VCU 17 are hardware-mapped such that a voice call on a specific frequency and slot assignment in the base station is always processed by the same VCU codec 16.

(Col. 8, lines 8-32)¹⁹ Although InterDigital contends that the “corresponding structure” is “two or more codecs 16 and equivalents thereof,” it is clear from the foregoing excerpt from the specification that what is being described is a “voice compression system” that is “known as a codec.” Expert witnesses for both InterDigital, Dr. Nikil Jayant, and Ericsson, Dr. Jerry Gibson, agreed that a codec performs coding and decoding. Transcript 476, 761. Also, both experts agreed that a codec has two components – a hardware component and a compression algorithm. Transcript 476, 479-81, 759-61. There can also be no question that the specification discloses two compression algorithms, namely the referenced Residual Excited Linear Predictive (REL P) algorithm and the referenced SBC encoder-decoder.

Why is that not the end of the issue? The reason is that InterDigital argued, and introduced testimony through Dr. Jayant, that once a codec is disclosed, one skilled in the art could make and use the claimed invention without having the benefit of a disclosure of any particular speech compression algorithm. InterDigital’s Post-Hearing Brief at 8. According to InterDigital, the specific algorithms were disclosed to satisfy the best mode requirement of 35 U.S.C. § 112(1), not the written description requirement, and that “Ericsson is seeking to penalize InterDigital for complying with the best mode requirement.” *Id.*

InterDigital’s argument, however, is simply misplaced. A valid patent (or more precisely, a valid claim) necessitates compliance with *all* of the various requirements of the patent statute, including the written description, enablement and best mode requirements, as well as the requirement for claim definiteness. Rather than being “penalized” for compliance, one is rewarded with a valid patent, assuming all other validity requirements have been met. The scope of the resulting patent is another issue. As discussed above, claims are construed in light of the specification. What an applicant chooses to say in the specification necessarily might influence claim interpretation and claim scope, regardless of which of the several validity requirements the applicant was attempting to address. When writing a specification and when drafting claims, applicants have a wide variety of

¹⁹ Further description of the “Voice Codec Unit” (VCU) appears at col. 42, lines 65 *et seq.* of the ‘089 patent.

choices. But those choices naturally have consequences, sometimes as the result of the statute, sometimes as the result of court decisions interpreting the statute, sometimes as the result of PTO procedures. Sometimes those choices have consequences affecting claim scope.

Patent preparation and prosecution requires a marriage of technical and legal knowledge, skill and judgment. That is perhaps the reason why, although applicants are entitled to prepare and prosecution their applications *pro se*, most applications are prepared and prosecuted by skilled, separately licensed, professional patent attorneys and agents.

When making choices about how claims are drafted, applicants generally have a choice whether to present claim elements drafted in means-plus-function form or not. Certainly there is no requirement that applicants use the means-plus-function format. If an applicant chooses to present claim elements in means-plus-function format that will be construed under § 112(6), the consequences of what the applicant chooses to say in the specification are evident from the words of the statute, namely that "such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." Thus, applicants not only have a choice whether to present means-plus-function format claim elements, but additionally, knowing that such elements will be construed under § 112(6), have a choice about what to disclose in the specification as the corresponding "structure."

Here, the applicants disclosed codecs 16 using either a RELP or SBC compression algorithm. The applicants did not disclose anything else. Accordingly, that is the corresponding "structure" disclosed in the specification.

In *WMS Gaming*, the Federal Circuit noted that the district court had "determined that the structure disclosed in the specification to perform the claimed function was 'an algorithm executed by a computer.'" According to the Federal Circuit, "[w]hile this finding accurately reflected the parties' stipulation, the court erred by failing to limit the claim to the algorithm disclosed in the specification." 184 F.3d at 1348.

The invention of the patent-in-suit controlled reels of a slot machine electronically using various algorithms to randomly determine the stop positions of each reel. Control circuitry randomly picked a number from a range greater than the number of stop positions in a look-up table that could be programmed to map those numbers to stop positions, *i.e.*, some stop positions were

mapped with more numbers than other stop positions. The result was that the probability of winning could be adjusted without changing the configuration of the reels or the size of the machines. The invention, apparently, was widely accepted in the industry, and became known as "virtual reel" slot machines.

One of the claim limitations in dispute called for "means for assigning a plurality of numbers representing said angular positions of said reel * * *." The district court and the Federal Circuit both agreed that recited a means-plus-function limitation. As noted above, the Federal Circuit held that the district court had erred by failing to limit the claim to the algorithm disclosed in the specification. The court reasoned that a "general purpose computer, or microprocessor, programmed to carry out an algorithm creates 'a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software.'" [Citations omitted.] 184 F.3d at 1348. Accordingly, the court held that in a "means-plus-function claim in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm." 184 F.3d at 1349. *Accord, Overhead Door Corp. v. Chamberlain Group, Inc.*, 194 F.3d 1261 (Fed. Cir. 1999)(corresponding "structure" included software algorithm).

InterDigital argues that *WMS Gaming* is inapplicable here because a "codec is already a special purpose computer." InterDigital's Post-Hearing Brief at 8. But the rationale of *WMS Gaming* did not center on general versus special computers. Rather, the court reasoned that when the disclosed structure is a programmable device that has been programmed to carry out an algorithm, the disclosed structure is not limited to the hardware alone, *i.e.*, the programmable device, but rather includes the algorithm as well. As noted above, here the expert witnesses tendered by both parties agreed that a codec included a hardware component that used or implemented an algorithm. Dr. Jayant, on behalf of InterDigital, for example testified:

SPECIAL MASTER: I would like, Dr. Jayant, to ask you a couple of questions. Could we get Figure 2 up there again?

Dr. Jayant, referring to the PowerPoint slide, if you recall where there were three types of codecs, a DSP algorithm and so forth. Do you remember that slide?

A. I do.

SPECIAL MASTER: Now, in each one of those three examples given in that slide, there's a hardware component that's a processor or computer element of some kind and then a software element. Is that correct?

A. That is correct.

SPECIAL MASTER: Is that always what a codec consists of, a microprocessor and software?

A. Yes, except in the last case where the algorithm has been wired into the ASIC in the hardware architecture itself.

SPECIAL MASTER: That would be firmware?

A. Yes. Closer to that, yes.

SPECIAL MASTER: Now, in the first example, DSP, you said that was a digital signal processor?

A. Yes.

* * * * *

SPECIAL MASTER: How long have these three times [sic. types] of codecs been used?

A. The first and the third have been used for a very long time, in the nature of 25 years or more. And the second varieties are relatively new.

SPECIAL MASTER: In 1985, would the – let me just ask you: In reviewing the patent at issue and particularly Fig 2 and Codec 16, did you reach any conclusion as to the type of codecs that the inventors were talking about?

A. Yes. They would most likely be of the first variety, the DSP plus software supporting the algorithm variety.

SPECIAL MASTER: Of the two types of algorithms that were specifically disclosed in the specification, were there other types of algorithms that were generally known as of 1985, to your knowledge?

A. The answer is yes.

Transcript at 489-492. The rationale of *WMS Gaming* is clearly applicable even if other types of algorithms were known.

InterDigital also urges that under *Atmel*, the "corresponding structure" disclosed in the specification includes, for purposes of § 112(6), not only the "structure" explicitly disclosed, but "structure" implicitly disclosed as well. InterDigital, for example, points to the testimony by Dr. Gibson, Ericsson's expert witness, that he would have known of algorithms other than RELP and SBC that could have been used:

SPECIAL MASTER: Back in 1985, I take it from Dr. Jayant's testimony and yours that there were other speech compression algorithms other than the RELP and the SBC available. Is that right?

A. That's correct.

SPECIAL MASTER: Would you, having a level of one of ordinary skill in the art, in reading this specification have known one other or two other or three other algorithms that could be used in that structure?

A. Yes, sir, I would have.

Transcript at 767-768. InterDigital's Post-Hearing Brief at 9. That one of ordinary skill in the art may have known of other algorithms, however, goes to the issue of whether those other algorithms are "equivalents" under § 112(6). That is an issue beyond the scope of *Markman* claim construction and must await trial.

Moreover, *Atmel* does not stand for the proposition that the "corresponding structure" disclosed in the specification includes not only that expressly disclosed but additionally structure "implicitly" disclosed as well. The panel majority in *Atmel* left no doubt that "structure supporting a means-plus-function claim under § 112, ¶ 6 must appear in the specification." 198 F.3d at 1381. When there is an issue raised *whether* there is sufficient structure disclosed to support the claimed function, and therefore an issue under § 112(2), the *Atmel* panel majority wrote that "the 'one skilled in the art' analysis should apply in determining whether sufficient structure has been disclosed to support a means-plus-function limitation flows naturally from the relationship between claim construction and § 112, ¶ 2." *Id.* at 1379. Here, no question has been raised whether the RELP or SBC algorithms provide support for the means-plus-function limitation. *Atmel* does not support InterDigital's argument.

Also, although Dr. Gibson testified that one of ordinary skill in the art would have known of other algorithms, Dr. Gibson also testified that "people would make different choices [among known algorithms] than maybe what's listed in there [in the specification], depending on the quality and the complexity and those kinds of things." Transcript at 770. *See also* Transcript at 768-69. Thus, knowing of "structures" other than those specifically disclosed (or, in this case other algorithms) does not necessarily mean those are appropriate "corresponding structures." Once again, the applicant has the ability to draft the specification and claims as she chooses. There may be reasons why an applicant chooses to disclose less than all of the known alternatives, a principal reason

being that the applicant may not believe that such alternatives are appropriate. If such non-disclosed alternatives are indeed truly "equivalents" under § 112(6), however, then the applicant's permitted claim scope is preserved without affecting the long-standing rule that the "corresponding structure" for purposes of § 112(6) is that actually disclosed in the specification.

InterDigital's argument that the specification provides support for general linear coding techniques, InterDigital's Post-Hearing Brief at 10, is inapposite for the same reasons. Whether RELP and analysis by synthesis coding are examples of a broader category of linear coding techniques is simply not relevant here. That may very well be relevant when the court addresses the issue of "equivalents" under § 112(6), but, once again, that is beyond the scope of *Markman* claim construction.

5. Recommendation

Accordingly, the special master recommends that the Court conclude that:

The corresponding "structure" disclosed in the specification for the "signal compression means" in claim 1 of both the '089 and '705 patents are codecs 16 using either a RELP or SBC compression algorithm and which perform the recited function, namely "for simultaneously compressing separate digital signal samples derived from said conversion means to provide separate compressed signals."

Under the terms of § 112(6), those claims should therefore be construed to cover that corresponding structure and equivalents thereof.

As noted above, Ericsson asserts in its proposed construction that "[a]s a matter of law, the claim element cannot encompass structure implementing a VSELP or an RPE/LTP compression algorithm." The special master expressly declines to recommend that construction to the Court. During this *Markman* phase of this litigation, only the "corresponding structure" under § 112(6) is determined. Whether or not a VSELP or an RPE/LTP (or other) compression algorithm may be considered an "equivalent" under § 112(6) to the identified "corresponding structure" must await trial. An "equivalent" for purposes of § 112(6), of course, differs from an "equivalent" for purposes of the doctrine of equivalents. Unlike the analysis under the doctrine of equivalents, the actual scope of a means-plus-function claim element under § 112(6) extends both (1) to the "corresponding structure," and (2) to "equivalents thereof." If a VSELP or an RPE/LTP compression algo-

nithm is found at trial to be an "equivalent" under § 112(6) to a RELP or SBC compression algorithm, then this claim element literally covers those other algorithms as § 112(6) "equivalents."

C. "channel control means"

1. The Claims

Again, the focus is on claim 1 in both the '089 and '705 patents. The "channel control means" clause is identical save for a one word variation, emphasized below. Claim 1 in the '089 patent calls for:

channel control means connected to said signal compression means for sequentially combining the compressed signals into a single transmit bit stream, with each of the respective compressed signals occupying a repetitive sequential position in the transmit bit stream. [Emphasis added.]

Claim 1 in the '705 patent calls for:

channel control means connected to said signal compression means for sequentially combining the compressed signals into a single transmit bit stream, with each of the respective compressed signals occupying a respective sequential position in the transmit bit stream. [Emphasis added.]

The parties agree that this "channel control means" element is drafted in means-plus-function form and is governed by § 112(6). On independent review and applying the analysis discussed above *vis-à-vis* the "conversion means" and "signal compression means" elements, the special master agrees.

2. The Specification

The specification initially explains that:

Each VCU 17 is connected to a channel control unit (CCU) 18. The CCU 18 controls the TDMA function and also functions as a link-level protocol processor. Each CCU 18 takes the transmit channel outputs of the codecs 16 in the corresponding VCU 17 and transmits the data in the proper time slot and in the proper format to a modem unit 19. Each CCU 18 determines the modulation levels, as directed by a remote-control processor unit RPU 20, to be used for the broadcast (such as 2, 4 or 16 level PSK modulation). Each CCU 18 also processes control information for communication to the subscriber stations through the radio control channel (RCC) time slot and during overhead control bits in the